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Forest Health Alert: Management and Control of Bark Beetles in Ponderosa Pine

There are four main bark beetles that attack ponderosa pine. Each has specific host preferences and conditions that contribute to attack. Use this and other guides to identify the beetles that are active in your area. Follow these suggestions to limit or reduce damage to valuable trees.

Red turpentine beetles usually attack only the base (bottom 6 feet) of trees. Attack is most common in the lowest 2-3 feet of the trunk. Wounds are marked by conspicuous, gravelly-looking pitch masses. Beneath the bark, the beetles make cave-like galleries that are shared by many larvae. Woodpeckers feeding on the larvae may completely remove broad bands of bark.

Red turpentine beetles do not usually kill trees unless they have been weakened or wounded by something else. Logging injuries, root disease and severe pruning may be culprits. Infested trees can be discriminated against in thinning operations, but do not warrant extreme control measures.

Pine engraver (*Ips*) beetles can be found in small diameter or thin-barked portions of ponderosa pine. They prefer slash, injured or recently killed trees, but when populations are high can attack otherwise fairly healthy trees. Their ability to produce 2 to 4 generations each year allows them to take advantage of large volumes of slash or damaged trees and build high populations rapidly in a single season. At the end of summer, the beetles overwinter in the duff, which usually causes sufficient mortality to put outbreaks to rest.

Identify *Ips* beetle egg galleries by the two to five clean galleries that extend from a central chamber. The beetles themselves have rear ends that look pushed in from above - like a car from the 50's with tail fins.

Avoid problems with *Ips* by avoiding creating large volumes of slash during the months January to June. High *Ips* populations can develop in this breeding material. If you can not avoid creating slash during these times, burn it promptly; lop and scatter it in the sun to facilitate rapid drying; make small piles in sunny areas and enclose them in clear plastic tarps to "cook" beetles beneath the bark; pile it in huge (house-sized) piles so the emerging insects may simply seek more moist slash deeper in the same pile, rather than attacking surrounding trees; or continue creating a supply of slash ("green chain") through the summer months so they will enter this material rather than surrounding trees. Never pile green firewood against living trees.

Western pine beetle and the mountain pine beetle are most capable of killing large numbers of ponderosa pine. **Western pine beetle** has two generations per year and its most likely targets are large, old ponderosa pines with low vigor. Such trees may be slow growing or have dying tops and twigs that have short, sparse foliage of poor color. They may be wounded, diseased or affected by drought. They may be the oldest trees in the stand. When beetle populations are

high though, every tree is a susceptible target. Western pine beetle has surprised entomologists in recent years by its ability to attack dense, small pole-sized ponderosa pines too.

These beetles make winding, crisscrossing galleries in the inner bark. The larvae mature in the outer bark, so woodpeckers merely chip the outer bark scales off when they are feeding on western pine beetle. They don't have to hammer down all the way to the wood.

The **mountain pine beetle** is associated with dense (over 150 ft² basal area) stands of pole-sized ponderosa pine. These beetles make long, vertical J-shaped egg galleries under the bark.

The most important weapon for preventing successful western and mountain pine beetle attacks on trees is the trees themselves. When trees are vigorous and healthy, they can defend themselves against insects and the fungi they carry. Landowners and foresters can improve the average tree vigor of most forest stands in order to improve insect resistance. Removing the least vigorous (slowest growing, diseased, broken or wounded) trees and relieving competitive stresses on the remaining trees help ward off beetle attacks. A partial cut or thinning can remove currently infested trees (green foliage, pitch tubes or boring dust at entry holes on the bark, blue stain in the outer wood, beetles present beneath the bark), remove the least vigorous trees and, at the same time, provide space for remaining trees to grow. The important concept is "thinning from below," removing the poorest trees, and leaving the thriftiest ones in a well-spaced array.

When dealing with young ponderosa pine stands, problems usually occur because there is heavy competitive stress among trees and the beetles can easily switch their attack between closely spaced trees. Stand closure and competitive stress become a significant influence on bark beetle populations when unmanaged stands reach about 60 years of age. Research conducted by Bob Gara and David Braun at the University of Washington's College of Forest Resources demonstrated an excellent increase in beetle resistance following thinning. Their guidelines, in the following table, encourage foresters to maintain the following concentrations of trees on the land:

	Regime 1	Regime 2	Regime 3
Inter-tree spacing (Feet)	13.1	19.7	26.3
Stem Density (Trees per Acre)	133	80	67
Tree Diameter (Inches)	11.4	12.2	12.7
Basal Area (Feet ² /Acre)	94	66	65

Regime 1 will result in high quality timber at the end of the rotation. Regimes 2 and 3 result in faster growing trees with less dense wood. Both the inter-tree spacing (affects beetles' capability to switch attack from one tree to another) and the basal area (affects competitive stress trees experience) are important components of improving stand resistance. This research was

conducted in Cle Elum. If your site is significantly drier, I'd veer toward higher inter-tree spacing levels.

In any thinning operation, care must be taken to avoid unnecessary soil compaction and avoid injuring residual trees. Thinning at any time of year can have immediate benefits for increasing resistance against bark beetles. Spring thinning may increase red turpentine beetle attacks. Turpentine beetles are probably not worth worrying about if trees are dying now. You must be cautious of *Ips* beetles and avoid creating large amounts of slash during the spring.

Natural enemies of bark beetles include clerid beetles and woodpeckers. Landowners should consider enhancing the populations of these natural predators. Are there large diameter snags available to provide nesting areas for woodpeckers? Trees which were killed by bark beetles a year or more ago and currently have red foliage don't pose additional bark beetle related threat. Leave a few of them for beneficial wildlife. Ant nests at the base of trees probably provide some bark beetle protection too. Don't destroy them.

Pesticides. There are few pesticides available for temporarily protecting high value pine trees from bark beetles. They may be expensive or require a licensed pesticide applicator to apply them. It does no good to kill beetles when the forest conditions which made the trees susceptible to bark beetles in the first place persist. The chemicals available depend on the use you have in mind - protecting unattacked trees or killing beetles that are inside dead trees.

If just a few trees of high value need protection, they can be sprayed with insecticide to kill the bark beetles that land on them and begin tunneling in. Follow label instructions. Generally, applying the chemical between April 15 and 30 will provide protection from early beetle flights (approximately May 1) through the end of the season. The chemical must be on the trees before the beetles arrive. The entire tree trunks must be thoroughly covered with insecticide in order to be effective. The lowest 20-25 feet is most important. Reapplication during the season should not be necessary, depending on the product you choose.

The treated trees and any other trees that are killed and have symptoms of attack in the current year should be examined to see if beetles got in and were able to lay eggs. If brood is developing, these trees should be burned, chipped, sent to a mill, or treated to kill the developing beetles. If only a few trees are involved, they can be mechanically treated by exposure to sunlight and heat or drying to kill the insects. Options include removing the bark in two parallel lines along opposite sides of the trunk then placing the logs in direct sunlight to facilitate drying, or enclosing small stacks of wood with clear plastic tarps in the sun to "cook" the beetles.

Chemical treatments are also technically an option for killing beetles, but it is difficult to effectively kill the beetles when they are protected beneath the bark. Other treatment methods, above, are more strongly recommended.

Pesticide registrations and legal uses may change without warning. Always read the pesticide label carefully and thoroughly before using any pesticide. It is a violation of state and federal law to apply a pesticide in a manner which is not described on the label.

Conclusion. Bark beetles are a problem associated with ponderosa pines stressed by advanced age, low vigor, injury, or temporary environmental factors. If unmanaged forest land with high numbers of susceptible and infested trees surrounds the site, or if severe drought occurs, the

beetles will not go away. Don't spend a lot of time and money trying to kill beetles. Instead, thin your stands, protect the most valuable trees, and don't increase problems by mis-managing slash. The trees have to fight the beetles themselves.

If you have questions about this information, please contact:

Karen Ripley, Forest Health Program Manager
DNR - Resource Protection
PO Box 47037
Olympia, WA 98504-7037
(360) 902-1691

E-mail: karen.ripley@dnr.wa.gov